

In the Claims:

1. (Original) A method of forming an aluminum structure in a microelectronic article, the method comprising:
forming a recess in a microelectronic substrate;
forming a metal-containing layer conforming to a surface of the recess and to an adjacent surface of the substrate;
plasma treating the substrate having the metal-containing layer thereon; and
depositing aluminum on the metal-containing layer to form an aluminum layer thereon.
2. (Original) The method of Claim 1, wherein depositing aluminum comprises depositing the aluminum at a temperature of about 160 °C or less.
3. (Original) The method of Claim 1, wherein forming a recess comprises forming a contact hole in an insulating layer of the substrate that exposes an underlying conductive region of the substrate.
4. (Original) The method of Claim 1, wherein the recess has an aspect ratio greater than about 1.
5. (Original) The method of Claim 1, wherein forming a metal-containing layer comprises forming the metal-containing layer by metal organic chemical vapor deposition (MOCVD).
6. (Original) The method of Claim 5, wherein the metal-containing layer is a barrier metal layer.

7. (Original) The method of Claim 6, wherein the metal-containing layer comprises at least one material selected from a group consisting of titanium nitride (TiN), tantalum nitride (TaN), titanium silicon nitride (TiSiN) and tantalum silicon nitride (TaSiN).

8. (Original) The method of Claim 1, wherein depositing aluminum comprises depositing aluminum on the metal-containing layer by chemical vapor deposition (CVD) using a methylpyrrolidine alane (MPA) source gas.

9. (Original) The method of Claim 1, wherein plasma treating the substrate comprises plasma treating using at least one gas selected from a group consisting of argon (Ar), hydrogen (H₂), nitrogen (N₂), oxygen (O₂), nitrous oxide (N₂O) and ammonia (NH₃).

10. (Original) The method of Claim 1, wherein plasma treating the substrate comprises plasma treating the substrate at a pressure in a range from about 1 Torr to about 6 Torr.

11. (Original) The method of Claim 1, wherein plasma treating the substrate comprises plasma treating the substrate at a power level in a range from about 600 W to about 1,000 W.

12. (Original) The method of Claim 1, wherein plasma treating the substrate comprises plasma treating the substrate for about 60 seconds.

13. (Original) The method of Claim 1:
wherein forming a metal-containing layer is preceded by forming an ohmic layer conforming to an interior surface of the recess and to the adjacent surface of the insulating layer; and

wherein forming a metal-containing layer comprises forming the metal-containing layer on the ohmic layer.

14. (Original) The method of Claim 13, wherein the ohmic layer comprises at least one of titanium (Ti) or tantalum (Ta).

15. (Original) The method of Claim 1:
wherein forming a metal-containing layer comprises forming a first metal-containing layer;
wherein plasma treating comprises plasma treating the substrate having the first metal-containing layer thereon;
wherein depositing aluminum on the metal-containing layer comprises depositing aluminum on the first metal-containing layer to form a first aluminum layer thereon; and
wherein the method further comprises:
forming a second metal-containing layer conforming to an interior surface of the recess and to an adjacent surface of the insulating layer;
plasma treating the substrate having the second metal-containing layer thereon; and
depositing aluminum on the second metal-containing layer at a temperature of about 160 °C or less to form a second aluminum layer thereon.

16. (Original) The method of Claim 1, wherein depositing aluminum comprises depositing aluminum by CVD until the recess is filled.

17. (Original) The method of Claim 1, wherein depositing aluminum comprises:
depositing aluminum by CVD to form a seed aluminum layer in the recess; and
sputter depositing aluminum on the seed aluminum layer in the recess; and
wherein the method further comprises reflowing the deposited aluminum in the recess.

18. (Original) The method of Claim 1, wherein plasma treating the substrate comprises plasma treating the substrate under conditions sufficient to cause aluminum to deposit at a greater rate on a portion of the metal-containing layer within the recess than on a

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portion of the metal-containing layer adjacent the recess during the depositing of the aluminum on the metal-containing layer.

19. (Original) The method of Claim 1, wherein the recess comprises one of a hole, a trench, a groove or a step.

20.-31. (Canceled)